



***Trichomycterus santanderensis*: A new species of troglomorphic catfish (Siluriformes, Trichomycteridae) from Colombia**

CESAR A. CASTELLANOS-MORALES

Autonomous Regional Corporation for the Defense of the Bucaramanga Plateau (CDMB), Colombia, and Department of Biology, University of Puerto Rico, Mayagüez, Puerto Rico 00680. E-mail: cesarcasla@gmail.com

Abstract

Trichomycterus santanderensis, described as a new species of troglomorphic catfish, was collected from the cave “El Puente” located in the upper Lebrija River basin of the Santander Department of northeast Colombia. The new species has light-red pigmentation, a first pectoral ray as long as the pectoral fin, and variable reduction in eye size. A comparative analysis with other troglomorphic species from South America and epigeal species from northern Colombia is presented.

Key words: Catfish, Trichomycteridae, Troglomorphic, Colombia, Siluriformes, Caves

Introduction

The Family Trichomycteridae is a diverse group of small- to medium-sized freshwater catfishes. The taxon's geographic range extends from Costa Rica to the Patagonia region of Argentina (Campanario & de Pinna, 2000). In South America, members of this family are found in the Pacific and Atlantic basins, and within the Andean mountain range from sea level to 4500 m (Nelson, 2006). Approximately 173 species in 41 genera and 8 subfamilies have been described (de Pinna & Wosiacki, 2003). With some 100 nominal species (de Pinna, 1992), *Trichomycterus* is the most diverse genus in the family and among the most taxonomically problematic genera of continental fish in South America. Its monophyletic status has been questioned by de Pinna (1989).

The Trichomycteridae is one of the most successful groups to occupy cave habitats. It currently contains eight troglomorphic species: *Ituglanis bambui* Bichuette & Trajano, *I. epikarsticus* Bichuette & Trajano, *I. passensis* Fernández & Bichuette, *I. ramiroi*, Bichuette & Trajano, *Silvinichthys bortayro* Fernández & de Pinna, *Trichomycterus chaberti* Durand, *T. itacarambiensis* Trajano & de Pinna and *T. spelaeus* Do Nascimento, Villarreal & Provenzano (DoNascimento, 2005). Species of *Trichomycterus* restricted to caves have been reported in the Umayalanta Cave in Bolivia (*T. chaberti*) by Durand (1968), Olhos d'Água Cave in Brasil (*T. itacarambiensis*) by Trajano & de Pinna (1996) and Punto Fijo Cave in Venezuela (*T. spelaeus*) by DoNascimento *et al.* (2001). In Colombia, 20 species have been reported in epigeal environments, and there is one unpublished report of a subterranean population of a non-troglomorphic species (Sket, 1988). This paper describes a new troglomorphic species of *Trichomycterus* from the cave “El Puente”, in the upper Lebrija River basin of the Santander Department, Colombia (Fig. 1).



FIGURE 1. Approximate location of *Trichomycterus santanderensis*, Cave El Puente, Upper Lebrija River basin of the Santander Department, northeast Colombia.

Materials and methods

The specimens are deposited in the Ichthyological Collection of the Autonomous Regional Corporation for the Defense of the Bucaramanga Plateau (CDMB), except for one individual sent to the Ichthyological Collection of the Natural Science Institute in Bogotá. All measurements were taken with dial calipers on the left side of the specimens (de Pinna, 1992). Morphology was observed with the aid of a stereomicroscope. Osteological data were obtained through dorsal and lateral x-rays (Wosiacki, 2005). Color was determined according to the Munsell soil color chart (1994). Comparisons to troglomorphic species were based on the literature. The acronyms and abbreviations used are SL: standard length, HL: head length, CAC-CDMB: Ichthyological Collection of the Autonomous Regional Corporation for the Defense of the Bucaramanga Plateau, and M: Munsell soil color chart.

Results

Trichomycterus santanderensis sp. nov.

Holotype. CAC-CDMB 035, 100.7 mm SL; Cave El Puente (07° 09' 49" N; 073° 17' 21" W), Portugal Street, municipality of Lebrija, upper Lebrija River basin, Santander, Colombia (Figs. 2, 3) collected by: Cesar Castellanos, Leccy Monsalve and Sohath Yusseff. 10 June 2005.

Paratype. CAC-CDMB 051, 78.7 mm SL; collected at the same place as the holotype by: Cesar Castellanos, Mauricio Pardo-Peñaloza, and Natalia Acero-R. 15 July 2005.

Non-type material. CAC-CDMB 050, 73.4 mm SL, dissected; CAC-CDMB 052, 55.5 mm SL, dissected; collected with paratype.

Diagnosis: *Trichomycterus santanderensis* (Figs. 2, 3) can be distinguished from other species of the genus by the following combination of characters: variable reduction in eyes from visible to imperceptible due to covering by a thick integument; relatively high head (62.5% of HL); enlarged mouth width (49% of HL); extended maxillary, nasal and rictal barbels (113.6%, 106.7% and 75% of HL, respectively); first pectoral ray extending as long filament, about 95% of pectoral-fin length; depth of the caudal peduncle 17.5% SL; caudal fin truncate with a slightly convex edge, upper portion of fin longer than lower portion; color varied from homogeneous light-red pigmentation of adults to pale rose with small grayish round spots on dorsum of young individuals.

Description: Morphometric data are presented in Table 1. Body elongated, deeper than wide, gradually deeper from trunk toward caudal peduncle; dorsal profile of trunk convex, marked by strong dorsal muscles

raised from nape to origin of dorsal fin; ventral profile of trunk straight, dorsal and ventral profile of caudal peduncle slightly convex.

TABLE 1. Morphometric measurements in *Trichomycterus santanderensis*. H: holotype; P: Paratype. Standard length expressed in millimeters. Data 2 to 11 expressed in percent standard length (SL), data 12 to 17 expressed in percent head length (HL).

	Character	H	P	Mean
1	Standard length (SL)	100.7	78.7	89.7
2	Total length	117.8	116.7	117.3
3	Body depth	16.8	15.7	16.3
4	Predorsal length	58.2	60.0	59.1
5	Preanal length	68.4	72.4	70.4
6	Prepelvic length	57.3	61.7	59.5
7	Caudal peduncle length	22.6	20.5	21.6
8	Caudal peduncle depth	17.6	17.3	17.5
9	Dorsal-fin base length	11.0	11.1	11.1
10	Pelvic-fin base length	3.5	3.3	3.4
11	Head length	18.2	18.9	18.6
12	Head width	99.1	93.8	96.5
13	Head depth	62.6	62.3	62.5
14	Mouth width	48.2	49.7	49
15	Nasal barbel length	100.2	113.1	106.7
16	Maxillary barbel length	116.6	110.6	113.6
17	Rictal barbel length	86.5	63.5	75



FIGURE 2. *Trichomycterus santanderensis*, holotype, CAC-CDMB 035, 100.7mm SL. Lateral view of the left side.

Integument thick and opaque, with well defined cutaneous folds forming vertical rings along entire trunk of specimens preserved in alcohol.

Head wide and depressed, triangular in dorsal view; dorsal profile of head straight, ventral and lateral profile convex; jaw muscle not particularly developed and not bulging from surface of head. Eyes positioned dorsally on anterior half of head, reduced in size from visible to imperceptible due to covering by thick integument.

Thick branchial membranes united to isthmus at anterior medial point, forming a free fold across isthmus. Gill opening free. Five or 6 branchiostegal rays barely visible in preserved specimens. Interopercular patch of

odontodes well developed, with 31 to 38 conical, elongated and deciduous odontodes arranged in 4 irregular rows, larger odontodes on posterior edge. Opercular patch of odontodes small, with 7-9 conical odontodes arranged in 3 irregular rows.



FIGURE 3. *Trichomycterus santanderensis*, holotype, CAC-CDMB 035; dorsal view of head.

Barbels extended and fragile at tips. Nasal and maxillary barbels extend beyond opercular patch of odontodes and surpass base of pectoral fin; maxillary barbel extends further than nasal barbel (nasal barbel longer in paratype). Anterior nostril surrounded by slightly raised thick integument, continuous with nasal barbel, both forming a tubular-shaped structure around the nostril. Posterior nostril oriented transversally, its anterior edge delimited by a thin and long flap of integument. Mouth inferior with corners oriented backwards. Lower lip with conspicuously fleshy lateral lobes. Teeth conical, arranged in 4 irregular rows on upper jaw and 3 rows on lower jaw.

Dorsal fin located beyond SL midpoint, rounded, with 2 simple rays and 7 branched rays. Anal fin similar to dorsal fin but smaller, with 2 simple ray and 5 branched rays, its origin at level of last dorsal-fin ray (in the paratype anal fin is located slightly after the last dorsal fin ray). Pelvic fin with 1 simple and 4 branched rays, its posterior edge reaching origin of anal fin; pelvic-fin originates at level of dorsal fin origin (located slightly after origin of dorsal fin in paratype); pelvic-fin widely separated at base, about 45% pelvic-fin base length. Pectoral fin rounded, with 1 simple ray and 8 branched rays, first ray a thin, fragile and long filamentous extension reaching 95% of length of fin of holotype.

Anus and urogenital opening almost equidistant between base of anal fin and base of pelvic fin, covered totally when pelvic fin is extended. Caudal fin obliquely truncated, with a slightly convex edge, dorsal side of larger upper rays longer than ventral side, I/13/I. Vertebrae 35 to 36. Ribs 12.

Coloration in live specimens: Body color light-red (M 2.5YR - 6/8), base of all fins yellow (M 2.5Y - 7/6). Paratype yellowish (M 10YR - 7/8) from head to origin of anal fin. The smallest specimen has small, irregular, circular, soft grayish blue stains (M 2GLEY 6/1) in 3 bands from head to origin of dorsal fin.

Coloration in alcohol: Body unpigmented, evenly clear or creamy yellow. Paratype with yellow tones at base of all fins (M 2.5Y – 7/6).

Ecological data: The Cave El Puente is located in the center of a mountain to the west of the Andean mountain range in Colombia and is not registered in the speleological inventory of Santander. The cave is oriented vertically with narrow, rocky passageways and galleries (Fig. 4) where water infiltration was observed. The wells are small, shallow, blocked by ceilings of rock and interconnected by reduced descending channels that drain the limited water flow. Water temperature during the sampling was 21.5 °C and cave temperature was 19.9 °C. The bottom of the wells is rocky and contains much sediment (only four specimens of *T. santanderensis* were collected here). Bloodsucking bats and a diversity of arthropods inhabit the interior of the galleries. The cave is located in an area untouched by agrochemical products, where the practice of sustainable agroforestry has maintained the flora and fauna relatively well conserved, and where the Autonomous Regional Corporation for the Defense of the Bucaramanga Plateau is preparing a conservation program (Castellanos, 2005).



FIGURE 4. Inside Cave El Puente.

Discussion

Identifying a new species of hypogean fish is difficult because physical characteristics such as lack of pigment and absence of eyes may correspond to epigean individuals highly modified for cave life. For this reason, a comparison with other troglomorphic species of *Trichomycterus* and with epigean species from the north of Colombia was conducted. The results indicate that *T. santanderensis* is a new species (*sensu* Wheeler & Plat-

nick, 2000) because it presents a unique combination of characteristics that differentiate it from previously reported epigeal and hypogean populations.

Of the species reported as strictly hypogean, *Trichomycterus santanderensis* differs from *T. chaberti* by the origin of its dorsal fin close to the anal papilla, and short filament on first pectoral-fin ray, whereas *T. santanderensis* has the dorsal-fin origin near the origin of the pelvic fin, and a very long filament on the first ray of its pectoral fin. *Trichomycterus santanderensis* presents a variable reduction in eye size, which does not occur in *T. spelaeus*, and it has a wider mouth than *T. spelaeus* (49% vs 32.5% HL); the pelvic-fin tip reaches the anal-fin base in *T. santanderensis* whereas the pelvic-fin tip in *T. spelaeus* reaches the urogenital opening. The origin of the pelvic fin of *T. santanderensis* is even with or slightly behind the dorsal-fin origin, while *T. itacarambiensis* has the origin of the pelvic fin anterior to the dorsal-fin origin. Also, in *T. santanderensis*, the anal-fin origin is located along a vertical line that passes the last ray of the dorsal fin, while in *T. itacarambiensis* the anal-fin origin is located midway from the base of the dorsal fin.

According to Dahl (1971) and Maldonado *et al.* (2005), the following Colombian species of *Trichomycterus* have sharp conical teeth, like those of *T. santanderensis*: *T. banneai*, *T. bogotense*, *T. latistriatum*, *T. nigromaculatum*, *T. retropinne*, *T. stramineum* and *T. striatum*. *Trichomycterus stramineum* is the most similar to *T. santanderensis*, from which it differs by the rounded form of the dorsal and ventral extremes of the posterior edge of the caudal fin (see Plate XLIX in Eigenmann, 1918) and by the position of the urogenital opening in relation to the pelvic fins: in *T. stramineum* the pelvic fins cover slightly the urogenital opening, while in *T. santanderensis* the urogenital opening is totally covered and almost equidistant between the base of the pelvic fin and its distal edge. The remaining species differ by the posterior origin of the dorsal fin with respect to the origin of the pelvic fin, located on or slightly behind the anus as in *T. retropinne* (Eigenmann, 1918) and also differ in the shape of the caudal fin, described as rounded in all species with the exceptions of *T. retropinne*, which has a round truncated caudal fin, and *T. banneai* which has a distinctively emarginated caudal fin (Eigenmann, 1918).

Etymology: The specific epithet "*santanderensis*" refers to the Colombian department (Santander) where the specimens were collected.

Acknowledgments

Francisco Correa provided information and data on the new species, Elvia E. Paéz of the CDMB supported my ichthyological studies in Santander, and Leccy Monsalve, Natalia Acero, Sohath Yusseff, Johao Pinzon and Mauricio Pardo-Peñaloza assisted in the speleological explorations and collection of specimens. Gail S. Ross, Nico M. Franz and José A. Mari Mutt kindly reviewed the text. This project was supported in part by the All Catfish Species Inventory project, funded by the U.S. National Science Foundation (DEB-0315963).

Literature cited

- Campanario C. & de Pinna, M.C.C. (2000) A new species of the primitive trichomycterid subfamily Copionodontinae from northeastern Brazil (Teleostei: Trichomycteridae). *Ichthyological Exploration of Freshwaters*, 11, 369–375.
- Castellanos-Morales, C.A. (2005) *Valoración preliminar del recurso ictiológico en la cuenca superior del río Lebrija, Santander, Colombia. Reporte técnico*. Corporación Autónoma Regional para la Defensa de la Meseta de Bucaramanga, CDMB, 40 pp.
- Dahl, G. (1971) *Los Peces del Norte de Colombia*. Ministerio de Agricultura, Instituto de Desarrollo de los Recursos Naturales Renovables INDERENA. Bogotá, Colombia, 391 pp.
- DoNascimento, C. (2005) Estatus taxonómico y sistemático de la población de bagres tricomictéridos de la cueva del Guácharo (Otophysi, Siluriformes). *Memorias del VII simposio colombiano de ictiología*. Choco. Colombia, pp. 44–50

- DoNascimento, C., Villarreal, O. & Provenzano, F. (2001) Descripción de una nueva especie de bagre anoftalmo del género *Trichomycterus* (Siluriformes, Trichomycteridae), de una cueva de la Sierra de Perijá, Venezuela. *Boletín de la Sociedad Venezolana de Espeleología*, 35, 20–26.
- Durand, J.P. (1968) Étude des poissons récoltés dans la grotte de Umayalanta (Bolivie), *Trichomycterus chaberti* sp. n. *Annales de Spéléologie*, 23, 343–353.
- Eigenmann, C. (1918) The Pygidiidae, a family of South American catfishes. *Memoirs of Carnegie Museum*, 7, 259–398, pls. 36–56.
- Munsell Soil Color Charts. (1994) Munsell Color Co. Baltimore, MD.
- de Pinna M.C.C. (1989) A new Sarcoglanidinae catfish, phylogeny of its subfamily, and a appraisal of the phyletic status of the Trichomycterinae (Teleostei, Trichomycteridae). *American Museum Novitates*, 2950, 1–39.
- de Pinna M.C.C. (1992) *Trichomycterus castroi*, a new species of trichomycterid catfish from the Rio Iguaçu of South-eastern Brasil (Teleostei: Siluriformes). *Ichthyological Exploration of Freshwaters*, 3, 89–95.
- de Pinna, M.C.C. & Wosiacki, W.B. (2003) Family Trichomycteridae (Pencil or parasitic catfishes). In: Reis, R.E., Kullander, S.O. & Ferraris, C.J. (Eds.), *Check List of the Freshwater Fishes of South and Central America*. Edipucrs, Porto Alegre, Brazil, pp. 270–290.
- Maldonado-Ocampo, J.A., Ortega-Lara, A., Usma-Oviedo, J.S., Galvis-Vergara, G., Villa-Navarro, F.A., Vasquez-Gamboa, L., Prada-Pedrerros, S. & Ardila-Rodriguez, C.A. (2005) *Peces de los Andes de Colombia: Guía de Campo*. Instituto de Investigaciones de Recursos Biológicos Alexander von Humboldt, Bogotá, Colombia, 346 pp.
- Nelson, J. (2006) *Fishes of the World*. 4th Edition, John Wiley and Sons. New York, 601 pp.
- Sket, B. (1988) Speleobiological investigations in the Colombian Andes 1984. *Bioloski Vestnik*, 36, 53–62.
- Trajano E. & de Pinna, M.C.C. (1996) A new species of *Trichomycterus* from eastern Brazil (Siluriformes, Trichomycteridae). *Revue Française d'Aquariologie et Herpetologie*, 23, 85–90.
- Wheeler, Q.D. & Platnick, N. I. (2000) The phylogenetic species concept (*sensu* Wheeler and Platnick). In: Wheeler, Q. D. & Meier, R. (Eds.), *Species Concepts and Phylogenetic Theory: a Debate*. Columbia University Press, New York, pp. 55–69.
- Wosiacki, W.B. (2005) A new species of *Trichomycterus* (Siluriformes: Trichomycteridae) from Brazil and redescription of *T. iheringi* (Eigenmann). *Zootaxa*, 1040, 49–64.

